Name:_____ Date:_____

Algebra 2 CC: Dividing Radicals

We can use what we know about the relationship between division and multiplication and the rule for the multiplication of radicals to write a rule for the division of radicals. We know that for any non-negative a and positive b, $\sqrt{a} \div \sqrt{b} = \frac{\sqrt{a}}{\sqrt{b}}$. Therefore, if a and b are positive real numbers, then:

$$\sqrt{a} \div \sqrt{b} = \sqrt{a} \cdot \sqrt{\frac{1}{b}} = \sqrt{\frac{a}{b}} \quad \text{or} \quad \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

Recall that a similar rule is true for roots with any index, and so we can write:

$$\sqrt[n]{a} \div \sqrt[n]{b} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$

Note: $\sqrt[3]{\frac{-8}{27}} = \frac{\sqrt[3]{-8}}{\sqrt[3]{27}} = \frac{-2}{3} = -\frac{2}{3}$ is a true statement because $\sqrt[3]{\frac{-8}{27}}$, $\sqrt[3]{-8}$, and $\sqrt[3]{27}$ are all real numbers. However, we cannot write $\sqrt{\frac{-4}{9}} = \frac{\sqrt{-4}}{\sqrt{9}}$ because $\sqrt{\frac{-4}{9}}$ and $\sqrt{-4}$ are not real numbers.

1. Jonathan said that $\frac{\sqrt{10}}{2} = \sqrt{5}$. Do you agree with Jonathan? Justify your answer.

2. Show that the quotient of two irrational numbers can be either rational or irrational.

Developing Skills

In 3–29 write each quotient in simplest form. Variables in the radicand with an even index are non-negative. Variables occurring in the denominator of a fraction are non-zero.

3. $\sqrt{24} \div \sqrt{6}$

4. $\sqrt{75} \div \sqrt{3}$

5. $\sqrt{72} \div \sqrt{8}$

6. $\sqrt{50a^3} \div \sqrt{5a}$

7. $\sqrt{24x^2} \div \sqrt{3x^3}$

8. $\frac{\sqrt{150}}{\sqrt{3}}$

9. $\frac{\sqrt{54}}{\sqrt{2}}$

10. $\frac{\sqrt{300}}{\sqrt{25}}$

11. $\frac{\sqrt{35a^3}}{\sqrt{10a}}$

12. $\frac{\sqrt{80x^2y}}{\sqrt{30xy^2}}$

13. $\frac{\sqrt{27b}}{\sqrt{6b^2}}$

14. $\frac{3}{\sqrt{3x}}$

15. $\frac{7}{\sqrt{7y}}$

16. $\frac{\sqrt{12a^2}}{\sqrt{4a}}$

17. $\frac{\sqrt{18c^3}}{\sqrt{9c}}$

18. $\frac{4\sqrt{2} + 8\sqrt{12}}{2\sqrt{2}}$

19. $\frac{3\sqrt{10} - 9\sqrt{50}}{3\sqrt{5}}$

20. $\frac{\sqrt{72} + \sqrt{54}}{\sqrt{18}}$

21. $\frac{\sqrt{20} - \sqrt{5}}{\sqrt{5}}$

22. $\frac{\sqrt{48} + \sqrt{3}}{\sqrt{3}}$

23. $\frac{\sqrt{10} + \sqrt{15}}{\sqrt{10}}$

24. $\frac{5 + 6\sqrt{5}}{\sqrt{5}}$

25. $\frac{\sqrt[3]{27x^3} + \sqrt[3]{36x^5}}{\sqrt[3]{3x^3}}$

26. $\frac{\sqrt[4]{ab^4}}{\sqrt[4]{a^2b^4}}$

27. $\frac{\sqrt[4]{c^6}}{\sqrt[3]{c^3}}$

28. $\frac{\sqrt[3]{24w^2}}{\sqrt[3]{3w^4}}$

29. $\frac{\sqrt{64x^4} + \sqrt[4]{40x^6}}{\sqrt[4]{x^6}}$